REMARKS

The above amendments to the above-captioned application along with the following remarks are being submitted as a full and complete response to the Official Action dated March 12, 2007.

In view of the above amendments and the following remarks, the Examiner is respectfully requested to give due reconsideration to this application, to indicate the allowability of the claims, and to pass this case to issue.

Status of the Claims

Claims 1-19 are under consideration in this application. Claim 7 is being further amended, as set forth in the above marked-up presentation of the claim amendments, in order to correct a minor formal error and to more particularly define and distinctly claim Applicants' invention. Applicants hereby submit that no new matter is being introduced into the application through the submission of this response.

Allowable Subject Matter

Claims 5-6, 9-10, and 17 would be allowed if rewritten to overcome the §112 rejection, and into independent form to include all limitations of the base claim and any intervening claims.

Formal Rejection

The Examiner rejected claims 1-19 under 35 U.S.C. § 112, first paragraph, as failing to comply with the written description requirement.

Applicants will contend that the recitations regarding the first and second images and the relationship therebetween is fully supported throughout the disclosure of the invention, including but not limited to Figures 2, 3 and 11, along with their corresponding descriptions in the specification, and the Summary of the Invention. Specifically, the Summary describes on page 3, line 23 to page 4, line 5 that "[i]n order to achieve the above-stated object, a method for searching character(s) image in an image according to the invention comprises steps of entering an image ***(i.e., first image)***, detecting a character region from the frame of the entered image on the basis of line features, extracting a first visual feature of the character area, providing a character string of interest ***(i.e., second image)*** which has been entered by a character input means, extracting a second visual feature from the character string image,

matching the first visual feature and the second visual feature to determine a level of similarity, and outputting the character region and the level of similarity.

According to Figure 2, as described on page 9, line 23 to page 10, line 2, "[a] flowchart of character-incorporated scene detection and feature extract is shown in FIG. 2. After variables are initialized at step 200, one frame is entered from a video image (step 201) ***(i.e., the first image)***. At the following step 202, filtering is carried out to remove character blurring peculiar to images." According to Figure 3, as described on page 10, lines 1-9, "[f]irst, variables and the like are initialized at step 300, and at the following step 301 any desired character string is inputted by the user via any extensively applied methods in a personal computer, word processor or the like. This character string is drawn into a bit map image ***(i.e., the second image)*** using a character font prepared in advance (step 302). Features of the character string are extracted from the image thereby obtained (step 303), and similarity is sought to all the features of the character strings memorized at the foregoing step 207 (steps 304 and 305). The features of the memorized character strings are sorted in a descending order of similarity as the result of the search (step 306)."

Further as described on page 16, lines 1-25, "[i]n the character string feature extraction at step 206, features of the character region extracted as a character-incorporated scene are extracted. Although it is also possible to memorize the character-incorporated scene itself as features to carry out classical image matching, such as template matching or the like, the quantity of data to be memorized would be too large, and many problems would be involved regarding arithmetic efficiency. In matching character image feature strings *(i.e., comparing the first image feature with the second image feature)*, because of the diverse difference in size between the character-incorporated scene and the template, the final result of matching should be obtained only after the highest level of similarly is determined. Two-dimensional matching without any size limitation involves a vast quantity of computation. Accordingly, it is unsuitable for any searching and matching of a large numbers of characters. . . . Therefore, the invention uses a one-dimensional feature string for matching 2D character images in which the number of vertical "edges" is counted once wherever the luminance changes in a predetermined way, such as from 0.fwdarw.1, at a predetermined density and the numbers are arrayed horizontally as shown in FIG. 10. By having information in the y direction, out of the two dimensions of x and y, represented by the number of "edges" whose value is unaffected by luminance change from inside to outside of the predetermined range, the image features of a character string are expressed in the one-dimensional feature string. . .

. For a character image written vertically, the number of horizontal edges of a one-dimensional feature string is counted at a predetermined density, and the numbers are arrayed vertically. . . . The character string features in an image obtained in this way are subjected (at step 304 of the flow shown in FIG. 3) to the calculation of similarity to the features of the user-entered character string (step 303), i.e. feature matching. . . .

Figure 11, as described on page 17, line 13 to page 18, line 12, illustrates a visual representation as seen by a user of how a character string image (i.e., the second image) is inputted by the user to compare with the characters in the video image (i.e., the first image).

In view of the above, Applicants will contend that the present invention as claimed is fully supported by the disclosure of the present invention, and thus fully complies with the written description requirement.

Prior Art Rejections

The Examiner rejected claims 1, 2-4, 7-8, 11-14, 16 and 18-19 under 35 USC § 103(a) as being unpatentable over an article entitled "Recognizing Characters in Scene Images" by Ohya et al. in view of Bauer et al. (US Pat. No. 6,751,603), and against claim 15 over Ohya and Bauer '603 in view of an article entitled "A Method for Recognizing Character Strings from Maps Using Linguistic Knowledge" by Akira et al. These rejections have been carefully considered, but are most respectfully traversed, as more fully discussed below.

The method for searching at least one character string image embedded in an image of the invention (for example, the embodiment depicted in Figs. 3 & 11), as now recited in claim 1, comprises: providing a first image (e.g., 701 in Fig. 11 or 800 in Fig. 12 embedded with a character string "大統領選 混迷续く"); detecting a character region 702 in the first image based upon a shape thereof; extracting a first image feature (e.g., the image of "大使館" in a box 703) of the character region 702; receiving an input of a *character string* of interest by a user (e.g., "大統領" in a text input region 706 for keyword entry in font GOTHIC in Fig. 11; p.7, line 17); generating a second image of said *character string* of interest (Step 302 in Fig. 3); extracting a second image feature (e.g., the image of "大統領") from the second image (Step 303 in Fig. 3); comparing the first image feature with the second image feature to determine a level of similarity 704 (e.g., 47%) (Step 304 in Fig. 3); and outputting the

character region 702 or the first image 701 comprising the character region 702 based on the level of similarity.

The invention recited in claim 7 is directed to an apparatus for searching character string images in an image according to the method recited in claim 1.

The invention recited in claim 11 is directed to a program stored on a computer readable medium for processing of a character search in an image according to the method recited in claim 1.

One of the features of the present invention is generating the first image of the character region from the frame of the image (such as video) and generating the second image of the inputted query word (which is the image of character string), and then comparing the first image and second image to determine the similarity between them.

In contrast to the prior art (p. 2, lines 1-20), the present invention is advantageous in that it does not need to perform character recognition in order to match the user-input with a section of the image, such that no recognition dictionary or language-based knowledge database is necessary. The user simply inputs a character string, which is converted into a second image by the invention, and extracts "the second image feature" therefrom to match with a character string image. The invention neither requires a dictionary for recognition or language-based knowledge database. Moreover, the invention provides a high degree of accuracy in searching a character string of interest as entered by a user.

Applicants respectfully contend that none of the cited references teaches or suggests a step of "generating a second image of said *character string* of interest [entered by the user]" as in the present invention.

In particular, Ohya describes in its abstract that "[a] character recognition process selects patterns with high similarities by calculating the similarities between character pattern candidates and the standard patterns in a dictionary. As noted in the disclosure of the present invention, the prior art as described in Ohya is recognized and distinguished on page 2, line 9 to page 3, line 14. Ohya as does the prior art in general needs a dictionary; a dictionary has to be prepared for each language. Also, Applicants have found that detecting words from an image, as is done in the prior art, is sometimes difficult, as the words are on the image and contrast for purposes for detecting the words is mixed.

As such, Applicants will strongly but respectfully contend that Ohya by itself fails to disclose, teach or suggest any combination of features that embody a structure or operation in which a first image is provided; a character region in the first image is detected

based upon a shape thereof; a first image feature of the character region is extracted; an input of a character string of interest is received from a user; a second image of said character string of interest is generated; a second image feature is extracted from the second image; the first image feature with the second image feature are compared to determine a level of similarity; and the character region or the first image comprising the character region based on the level of similarity is outputted.

Bauer was relied upon by the Examiner to teach "searching string image" entered by a user. Contrary to the Examiner's assertion, Bauer merely discloses a conventional data file selection method, wherein data files to be searched includes pictures (see column 5, lines 45-57 and 43-4, and data files are selected by a character string input by the user (see column 2 lines 32-35. Bauer falls far short of providing any disclosure, teaching or suggestion that would make up for the deficiencies in Ohya such that their combination could embody all the features of the present invention as claimed.

Applicants again respectfully contend that one skilled in the art would not be motivated to combine Ohya with Bauer in the ways suggested by the Examiner. The alleged reason to incorporate Ohya into Bauer or Bauer into Ohya is simply improper.

With respect to Akira, Applicants will again point out that this reference only relates to how to recognize characters from the map, and fails to compensate for the deficiencies in Ohya, Bauer and their combination.

Applicants will strongly but respectfully contend that none of the cited references or their combinations teaches or suggests each and every feature of the present invention as recited in independent claims 1, 7 and 11. As such, the present invention as now claimed is distinguishable and thereby allowable over the rejections raised in the Office Action. The withdrawal of the outstanding prior art rejections is in order, and is respectfully solicited.

Conclusion

In view of all the above, clear and distinct differences as discussed exist between the present invention and the prior art references upon which the rejections in the Office Action rely, Applicant respectfully contends that the prior art references cannot anticipate the present invention or render the present invention obvious. Rather, the present invention as a whole is distinguishable, and thereby allowable over the prior art.

Favorable reconsideration of this application is respectfully solicited. Should there be any outstanding issues requiring discussion that would further the prosecution and allowance of the above-captioned application, the Examiner is invited to contact the Applicants' undersigned representative at the address and telephone number indicated below.

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